Evolution of the specialization of the Tunisian international trade on the European market

Afef Souguir

Faculty of Economic Sciences and Management of Sousse, University of Sousse., Faculty of Economic Sciences and Management of Sfax, University of Sfax

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Afef Souguir

Faculty of Economics and Management of Sfax, University of Sfax, Tunisia,

Research Unit: MOFID, Faculty of Economics and Management of Sousse, University of Sousse, Tunisia

Email: afifamrz@yahoo.fr

Abstract:

In this study, we try to evaluate the specialization of the Tunisian international trade in relation to the European Union's (EU-28) market during the 2004/2015 period. Trade between Tunisia and the EU has grown significantly since the signing of an EU-Tunisia Association Agreement in 1995. The examination of relative trade benefits showed that Tunisia has the highest relative trade advantage in the EU-28 in mineral fuels, lubricants and related materials (SITC 3). On the other hand, the need for modernization and restructuring of their productive production facilities stimulated the European exports of capital goods and high-tech products (chemicals and related products (SITC 5) and machinery and transport equipment (SITC 7)). The crossed trading of similar products also intensified sharply over the 2004/2015 period.

Keywords: Intra-industry trade specialization; relative trade advantage index; Grubel Lloyd index.

JEL Classification: *F1.*

1. Introduction

International trade and specialization increase production, besides, they are sources of growth. Thus, specialization allows an optimal allocation of resources at the global level that will benefit all. As a result, the evolution of specialization over time is a phenomenon that generally reflects deep structural changes in a country's economic system.

Traditional international trade theorists (A. Smith, D. Ricardo and Hecksher-Ohlin) argue that countries have an interest in trading with one another while correlatively explaining the emergence of specializations in the domestic productive apparatus based on the existence of absolute and comparative advantages or differences in factor endowments. Therefore, we are dealing with specialization inter-industrial. Because each country exports the good for which it has a comparative advantage, and this comparative advantage comes from the fact that the production of the good in question uses more of the productive factor that the country has in abundance (Hecksher-Ohlin's theorem). Inter-industrial trade refers to the simultaneous exchange of goods belonging to different sectors (Algieri, 2008).

Furthermore, inter-industry specialization is put forward by some authors to speak about a dynamic comparative advantage or a comparative advantage innovation (Lafay and al, 1989). However, the development of trade between the most developed industrialized countries the factor endowments of which are a bit different suggested that there is a gradual reduction of the comparative advantages or differences of factorial endowments because of the development of the dissemination of knowledge and the know-how and the existence of patents of production. Therefore, the new theory of international trade rather stresses the conditions of the emergence of intra industrial specializations (Greenaway and Torstensson, 1997). This trade phenomenon is about similar products.

In this context, two approaches have been applied in order to examine the structure of the Tunisian trade specialization. First, the relative commercial advantage index is used to identify patterns of comparative advantage. Secondly, the Grubel-Lloyd index is used as an indicator of the degree of intra-industrial specialization to predict the structural changes in Tunisia.

The present article contributes to the understanding of the impact of the nature of goods, the process of globalization and integration, the global economic crisis, the revolution and the economic size of the partners on the Tunisian commercial specialization. This remaining part of article is structured into four sections, namely: (2) the relative trade advantage, (3) the intra-industrial trade, (4) the analysis of the data, and (5) a conclusion.

2. The relative trade advantage

Since it is difficult to directly measure the comparative advantage due to the difficulty of measuring the deviations of the costs (lack of statistical data), an indirect measure based on international trade flow should be used. The concept of the revealed comparative advantage (RCA) was developed, for the first time, by (Balassa, 1965), who states that international trade in goods reflects the cost differences between countries and therefore reveals the comparative advantages of these countries. The observations formulated about the business performance are intended to measure the revealed comparative advantages. In fact, the more the relative performance of a country is important in a particular property, the more its comparative advantage in the production of this property is significant (Balassa, 1977).

The revealed comparative index (RDA) is defined by Balassa (1965) as follows:

$$ACR_{j\,(i,n)} = \frac{\frac{X_{j\,(i)}}{TX_{\,(i)}}}{\frac{X_{j\,(n)}}{TX_{\,(n)}}}$$

where ACRj (i, n) represents the revealed comparative advantage of country *i* in reference to area *n* for the product (sector) j. X- export; and T a set of products (sectors). If ACRj (i, n) > 1 then, the country has a comparative advantage over its partners, however, if ACRj (i, n) <1, then the country has a disadvantage in the product (sector) j.

Although commonly used to study the comparative advantages, the Balassa index has several drawbacks that, if not taken into account, can distort the conclusions (see e.g., Benedictis, Tamberi, 2001; Dalum et al., 1998; Hoen and Oosterhaven, 2006; Jambor, 2013; Laursen, 2015; Leromain and Orefice, 2013; Yeats, 1985 and Yu, Cai and Leung, 2008). This has led some authors, like (Laursen 1998, Proudman and Redding (1997, 2000), to propose several modified versions.

Another specification of the revealed comparative advantage, which is called the Relative Trade Advantage (RTA), was proposed by T. Vollrach in 1991. It is calculated as the difference between the relative export benefit (AXR), which equals Balassa index (ACRj (i, n)), and the relative import advantage (AMR):

$$\mathrm{RTA} = \mathrm{AXR} - \mathrm{AMR}$$

with $\mathrm{AXR} = \mathrm{ACR}_j(i,n)$;

$$AMR = \frac{\frac{M_{ij}}{M_{it}}}{\frac{M_{nj}}{M_{nt}}}$$ and

M = import

A positive value of the RTA indicates comparative trade advantages, while a negative value indicates comparative trade disadvantages. Indeed, if RTA>0, a comparative advantage is revealed, that is to say, a sector in which the country is relatively more competitive in terms of trade.

In our opinion, the RTA index is the best way to measure the inter-industrial specialization between Tunisia and the EU-28 in the European market because this index helps evaluate a sector in which the country is relatively more competitive in terms of exchanges.

3. Intra-industrial trade

Most of the studies carried out so far in this context showed that cross-traded countries are very similar to one another as they specialize in one specific sector commodity "mainly because the increase of the quantities produced by this specialization will reduce the

production costs" (Lassudrie Duchene, Muchielli 1979). Since most of the trade between Tunisia and the EU is intra-industrial, this study uses valuation methods for this type of trade. To characterize the intra-industrial nature of commercial specialization, we use the index developed by Grubel Lloyd (1975). Therefore, the mathematical formulation of this index is as follows:

$$GL_j = 1 - \frac{|X_j - M_j|}{(X_j + M_j)}$$

Where GLj is the intra-industry trade index, Xj the export of product (sector) j and Mj the import of product (sector) j.

This index measures the simultaneous trade proportion of the total foreign trade of the product (sector) j by adopting values between 0 and 1. In the first case, it is said that trade is completely inter-industrial and the simultaneity of the flows is absent, whereas in the second case, it is considered totally intra-industrial and simultaneity is maximal. Moreover, it should be noted that trade imbalance between trading partners leads to a downward drift in the value of the GLj index, in other words, the theoretical maximum value 1, which corresponds to one hundred percent of intra-industry, remains out of reach. A series of low GLj indices of a region or a country reflects a centripetal process of industrial agglomeration and high specialization, while a series of high index values of GLj reflects a centrifugal process of industrial dispersion. In fact, the analysis of the evolution of Tunisia's intra-industry trade index with the EU shows that it is moving towards an intra-industrial trend.

4. Data analysis

This study uses the relative trade advantage index to measure the pattern of trade specialization between Tunisia and the EU-28 in the intra-EU market. The nature and structure of the trade specialization between Tunisia and the EU-28 are calculated using the Relative Trade Advantage Index and the Standard International Trade Classification (SITC) Revision 3 (table 1).

Table 1. Index of the relative commercial advantage of Tunisia with the EU between 2004 and 2015

Sector	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Food, drink, tobacco (SITC 0+1)	0,02	0,06	-0,06	-0,14	-0,23	-0,02	-0,19	-0,15	-0,10	-0,29	-0,17	-0,24
Raw materials (SITC 2+4)	1,24	0,79	1,56	0,68	0,77	0,19	0,30	0,08	0,17	0,48	-0,05	1,40
Mineral fuels, lubricants and related materials (SITC 3)	0,45	-0,05	-0,14	1,22	1,31	1,38	0,74	0,40	0,36	0,09	-0,13	-0,70
Chemicals and related products (SITC 5)	-0,41	-0,42	-0,45	-0,38	-0,33	-0,41	-0,37	-0,46	-0,44	-0,45	-0,48	-0,56
Other manufactured goods (SITC 6+8)	0,49	0,58	0,45	0,32	0,25	0,30	0,29	0,30	0,28	0,28	0,33	0,29
Machinery and transport equipment (SITC 7)	-0,32	-0,28	-0,32	-0,27	-0,30	-0,24	-0,15	-0,05	-0,08	0,03	0,08	0,12

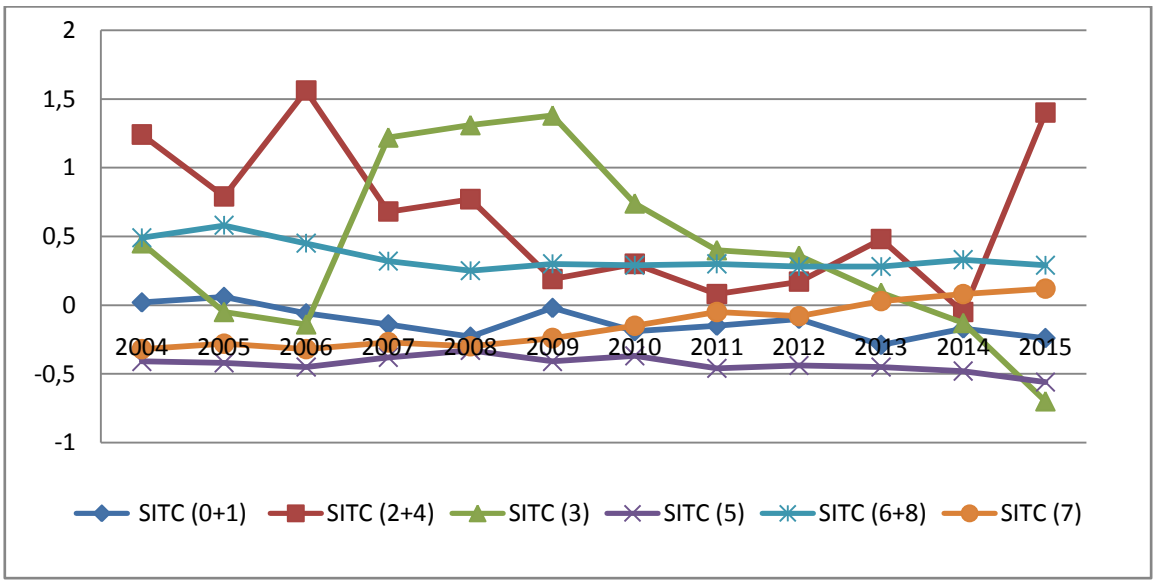
Source: the author's calculations based on data from Eurostat

The measures of the Tunisian trade revealed relative trade advantages (RTA> 0) in raw materials (SITC 2+4) in the EU-28 markets during the 2004/2015 period (except for 2014, where RTA < 0). To a lesser extent, there is a relative trade advantage in other manufactured products (SITC 6+8). These values are relatively low (RTA is around zero). The data in table

1 also show that in 2007/2012, Tunisia had the highest relative trade advantage in mineral fuels, lubricants and related materials (SITC 3). These favorable levels deteriorated in 2014-2015, then, Tunisia experienced relative trade disadvantages in the EU-28 (RTA<0) markets. This situation shows that Tunisia has the highest relative trade advantages with low value-added products.

The position of Tunisia regarding the products (SITC 0+1), (SITC 5) and (SITC 7) is unfavorable.

Figure1. The evolution of Tunisia's relative trade advantage index with the EU between 2004 and 2015



Source: Constructed by the author based on table 1.

The graph above shows that the RTA index for the product groups (0+1, 2+4, 5 and 6+8) has recorded an unstable trend over the period under consideration while that of products (7) was characterized by a general trend on the rise. Starting in 2009, the relative trade advantage in product (3) declined quite sharply until reaching a low point in 2015. In fact, the index of intra-industry trade between Tunisia and its main partners during the 2004/2015 period is calculated using the Grubel Lloyd index and the SITC revision 3 (table 2).

Table2. Intra-industrial trade between Tunisia and its trading partners over the 2004/ 2015 period.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
EU-15	0,94	0,93	0,94	0,98	0,98	0,95	0,93	0,95	0,93	0,93	0,94	0,95
EU-25	0,94	0,92	0,94	0,97	0,98	0,95	0,92	0,95	0,93	0,92	0,93	0,95
EU-27	0,94	0,92	0,93	0,97	0,98	0,94	0,92	0,95	0,92	0,91	0,92	0,94
EU-28	0,94	0,92	0,93	0,97	0,98	0,94	0,92	0,95	0,92	0,91	0,92	0,94
Austria	0,61	0,86	0,84	0,92	0,64	0,94	1,00	0,79	0,80	0,81	0,72	0,52
Belgium	1,00	0,93	0,99	0,98	0,98	0,72	0,98	0,96	0,96	0,91	0,95	0,93

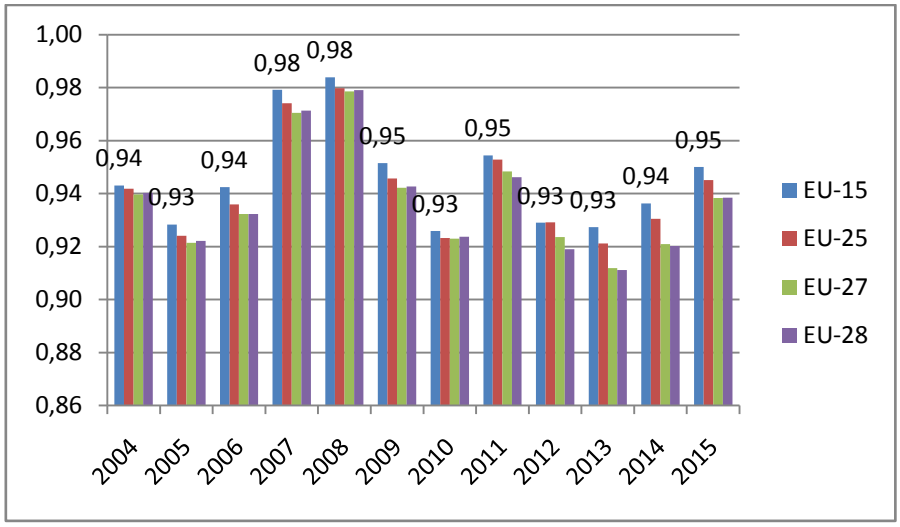
Denmark	0,45	0,37	0,50	0,19	0,39	0,50	0,64	0,31	0,30	0,57	0,44	0,45
Finland	0,09	0,16	0,08	0,02	0,29	0,10	0,05	0,04	0,03	0,01	0,05	0,12
France	0,97	1,00	1,00	0,93	0,94	0,98	1,00	0,96	0,99	0,99	0,93	0,97
Germany	0,90	0,88	0,88	0,89	0,97	0,96	0,88	0,93	0,96	0,99	0,95	0,96
Greece	0,67	0,79	0,54	0,66	0,65	0,49	0,23	0,41	0,47	0,25	0,14	0,23
Ireland	0,89	0,75	0,96	0,45	0,98	0,96	0,79	0,71	0,59	0,60	0,42	0,23
Italy	0,97	0,86	0,90	0,92	0,88	0,89	0,81	0,91	0,83	0,83	0,80	0,86
Luxembourg	0,98	0,92	0,87	0,72	0,94	0,45	0,17	0,19	0,09	0,11	0,74	0,04
Netherlands	0,93	0,91	0,84	0,96	1,00	0,87	0,86	0,93	0,77	0,91	0,97	0,79
Portugal	0,62	0,63	0,68	0,58	0,53	0,28	0,88	0,31	0,73	0,22	0,18	0,45
Spain	0,89	0,91	0,96	0,98	0,97	0,73	0,78	0,77	0,69	0,72	0,59	0,87
United Kingdom	0,98	0,87	0,95	0,73	0,72	0,59	0,45	0,76	0,61	0,56	0,69	0,98
Sweden	0,39	0,48	0,31	0,40	0,37	0,25	0,24	0,21	0,27	0,38	0,52	0,25

Source: the author's calculations based on data from Eurostat

An analysis of intra-industry trade between Tunisia and the European Union showed that the value of the GLI index is close to 1 (table 2). This is due to the fact that the EU is Tunisia's main trading partner since, in 2004-2015, the part of the goods exported to the EU was the largest compared to the other products. In fact, in 2015, exports of Tunisian products accounted for 74.7% of total exports, registering an increase of 4.4%, mainly due to increased exports from Tunisia to its European partners, such as Spain, with 133.6%, the United Kingdom, with 154.6% and France, with 2.3%. On the other hand, there was a decrease in sales to other countries, such as Italy, with 7.2%. Moreover, imports from the EU, which were estimated at 54.3% of the total imports, dropped by 5.1% to stabilize at 5242.2 MD. In fact, France, Italy and Germany have maintained their first places on the list of Tunisia's main suppliers, with respective shares of 16.8%, 14.3% and 6.6%, despite the fact that their imports dropped by 4.4% with France, 8.4% with Germany and 15.6% with Italy (INS, March 2015).

As can be seen from figure 2, the growth trend during the 2005/2008 period was the main characteristic of the Tunisian intra-industry trade with the EU15, 25, 27 and 28, however, a decrease of these indices was observed in 2009.

Figure 2: The development of intra-industry trade between Tunisia and the EU during the 2004/2015 period.

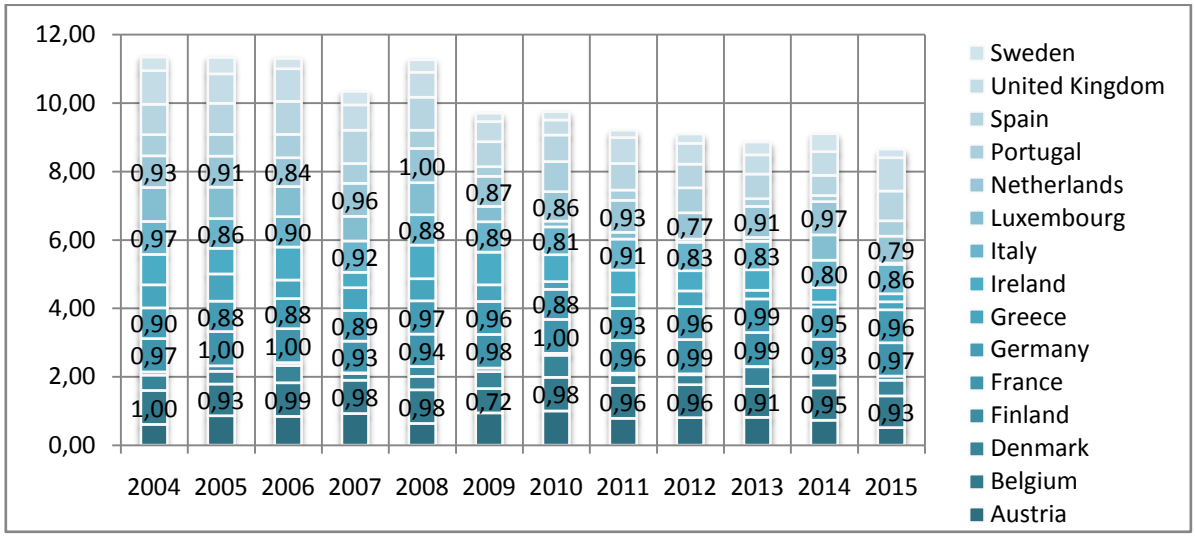


Source: built by the author from the Eurostat database

Moreover, in 2009, the economic crisis severely affected the exports and imports. Indeed, the GL index fell sharply from 0.98 in 2008 to 0.95 in 2009 and 0.93 in 2010. This decline was largely due to lower commodity prices. After a rapid growth from 2010 to 2011, the year of the Tunisian revolution, intra-industry trade was still affected by recording a fall in 2012 before stagnating in 2013 and then increase in 2014. Despite a robust recovery in 2015, the intra-industry trade index remained below its 2008 peak.

Actually, this resumption of intra-industry trade is the consequence of the privileged partnership between the EU and Tunisia, which was approved after the revolution on November 19, 2012, and which set itself the target of further enhancing bilateral relationships, among other things, through a greater economic integration, by concluding a deep and comprehensive free trade agreement (DCFTA).

Figure 3: The development of intra-industry trade between Tunisia and its main EU partners during the 2004/2015 period.



Source: built by the author from the Eurostat database

The analysis of the intra-industry trade index with the EU's neighboring countries is of special interest, since Tunisia's key partners, such as France, Italy, and Germany, have initiated a process of economic integration. In general, Tunisian intra-industry trade is moving towards simultaneity recording GL indices close to 1. This is rather a logical consequence of any integration process.

However, this overall figure highly reflects the differentiated developments of intra-industry trade between Tunisia, Denmark, Finland, Greece and Sweden, which are taken into account in our study. Moreover, it should be recalled that trade between Tunisia and these countries is limited to a small number of products. The limitation of these exchanges, which has a single meaning export or import, explains the existence of an inter-industrial trade and permanent fluctuation of the GL index.

The analysis of intra-industry trade between Tunisia and the EU, according to the SITC, shows that differences in the separate groups are paramount. (table 3).

Table3: Intra-industrial trade between Tunisia and the EU between 2004 and 2015 according to the SITC.

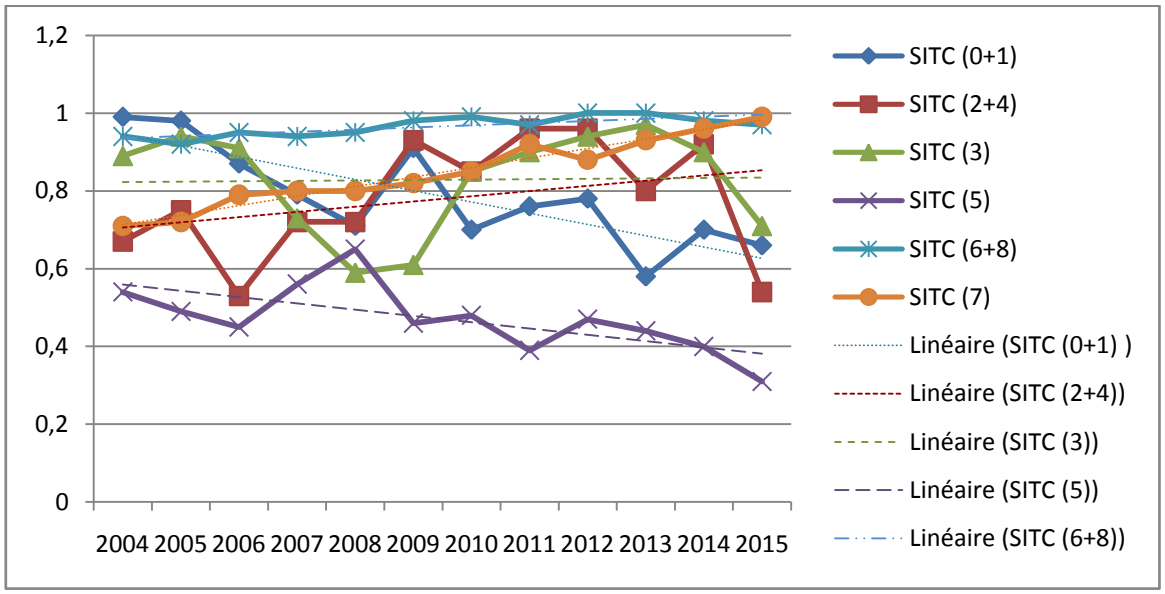
Sector	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Food, drink, tobacco (SITC 0+1)	0,99	0,98	0,87	0,79	0,71	0,91	0,70	0,76	0,78	0,58	0,70	0,66
Raw materials (SITC 2+4)	0,67	0,75	0,53	0,72	0,72	0,93	0,85	0,96	0,96	0,80	0,92	0,54
Mineral fuels, lubricants and related materials (SITC 3)	0,89	0,94	0,91	0,73	0,59	0,61	0,85	0,90	0,94	0,97	0,90	0,71
Chemicals and related products (SITC 5)	0,54	0,49	0,45	0,56	0,65	0,46	0,48	0,39	0,47	0,44	0,40	0,31
Other manufactured goods (SITC 6+8)	0,94	0,92	0,95	0,94	0,95	0,98	0,99	0,97	1,00	1,00	0,98	0,97
Machinery and transport equipment (SITC 7)	0,71	0,72	0,79	0,80	0,80	0,82	0,85	0,92	0,88	0,93	0,96	0,99

Source: the author's calculations based on data from Eurostat

Intra-industrial trade is more obvious in exchanging manufactured goods, which may mark a reconstitution of the industrial basis at the EU-Tunisian level. Nevertheless, the structure of intra-industry trade is quite variable depending on the year, due in part to the limited weight of trade in chemicals. In fact, in chemicals and related products (SITC 5), the GL index illustrates an inter-industry orientation since Tunisia is a net importer from its neighboring countries.

In the following figure, we can analyze the evolution of the nature of international trade between Tunisia and the EU.

Figure 4: Evolution of the nature of Tunisian international trade per activity sector



Source: Constructed by the author based on table 1.

Compared to the year 2014, the development of intra-industry trade per product group in 2015 was as follows: For the products (SITC 0+1), (SITC 2+4), (SITC 3), (SITC 5) and (SITC 6+8), intra-industry trade was declining while for the group (SITC 7), the GL index was rising (from 0.96 to 0.99). This regression is due in particular to the growing gap between exports and imports. If this gap persists, the country will have difficulties in honoring its commitments, particularly in terms of debt service.

5. Conclusion

Our task consists in studying the model of the Tunisian trade specialization using the relative trade advantage index (RTA) as well as that of the intra-industrial trade (GL) relating to the standard classification for international trade (SITC) revision 3, of Tunisia with the EU-28 during over the 2004/2015 period.

In fact, at the beginning of the 2007/2012 period, Tunisia achieved the best relative trade advantage in (SITC 3) products on the EU market, however, these advantages have deteriorated over time. These results show that the effects of the Tunisian political and social environment reflect difficulties for (SITC 3) products. In contrast, the RTA measures found that chemicals and related products (SITC 5) were considered the most disadvantageous, and to a lesser extent, the (SITC 0+1) and then, the (SITC 7) products. Subsequent developments indicate a slight improvement of the RTA for (SITC 7) products with a shift from initial relative trade disadvantages to relative trade advantages. Therefore, it can be said that the products that benefited from the relocation of production from the industrialized countries had their weight increase, while the trade of (SITC 0+1) products with the EU-28 market continued to suffer relative trade disadvantages.

On the other hand, between 2004 and 2015, intra-industry trade between Tunisia and the EU 28 has increased significantly, as shown by the evolution of the GL index. According to this

indicator, cross-trade flows increased for products (SITC 7) and (SITC 6+8), which in particular reflects the nature of the trade specialization of the countries examined.

Conversely, chemicals and related products (SITC 5) for which Tunisia is the most disadvantageous are less simultaneously traded. As a result, there is significant potential for Tunisia to expand its intra-industry trade (IIT) in the chemical industry due to the small scale of intra-industry trade in these products. To make the integration into the global economy easier, particularly in the European market, Tunisia should consider developing IIT in chemicals. In this regard, it is recommended that Tunisia pay greater attention to the factors affecting intra-industry trade in chemicals and related products (such as product differentiation, economies of scale and consumer's preferences).

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